IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Washington, D.C., United States of America
Utility Patent Application
For

Ceiling Mount Light With 360-Degree Motion Sensor

By
Gregory L. Sibalich, 2618 Lost Cove Court, Bowling Green, Kentucky, a US Citizen

Roger Dennis Cornett, 800 Mooreland Drive, Bowling Green, Kentucky a US Citizen

Chik Kin Wing Ricky, Flat H, 20/F, Block 6, 45 Lung Mun Road, Tuen Mun, N.T., Hong Kong, a Chinese Citizen

CROSS-REFERENCE TO RELATED APPLICATIONS

Not applicable

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a ceiling mount light with a motion sensor. More specifically, this invention relates to a ceiling mount light with a single spherical-shaped lens to provide 360-degrees of motion-sensing coverage in any direction, whereby motion sensitivity can be adjusted up to about 30 feet in any direction with light mounted at 8 feet.

2. Description of the Related Art

Conventional decorative wall mounted light fixtures with motion sensors are available for serving as light sources in a variety of areas, such as passageways, streets, parking lots, and gardens, and are energy-efficient and have longer lifetimes due to their non-successive use. Passive infrared sensors have been utilized in various motion-sensing devices, such as light fixtures, to sense and alert the motion and/or presence of a person. Improvements came about

when these passive infrared sensors were developed to include a number of lenses, facets, and detector heads, all of which can be oriented so that a person can be detected.

SUMMARY OF THE INVENTION

In view of known deficiencies associated with earlier motion detection light fixtures, the present invention is an motion activated ceiling mount light fixture which has at least one illumination source and a single spherical-shaped lens and a single motion sensor which can detect movement of heat in a 360-degree range viewing field. The motion detector assembly is removably mounted to the base plate and positioned within the lamp shade assembly such that the single spherical lens protrudes through a hollow recess, or opening, in the lamp shade assembly, which in turn is removably mounted to the base plate.

The motion sensor may be set to a set sensitivity range such that when a heat source passes within the 360-degree range viewing field, within the set sensitivity range, the luminaire emits a luminance for a set period of time, and within the set sensitivity range, the infrared motion sensing ceiling mount light may emit a lower lighting level when a heat source is not passing near the sensor. Integrated passive infrared electronics may be used as the motion sensing component mounted in the lamp housing which covers the electrical components of the light fixture. Optionally, the sensitivity regulating switch may be used to adjust the level of sensitivity of the motion sensor up to about 30 feet in any direction with light mounted 8 feet from the ground and the time regulating switch may be used to adjust the length of illumination after detection by the motion sensor. The lamp shade assembly may include a support frame, a base frame, a decorative ring encircling the hollow recess or opening, and a plurality of panels,

which may be of glass. The base frame may include socket assemblies for light bulbs and a cross bar assembly to mount the fixture to the electrical junction box in the ceiling.

In another embodiment, the ceiling mount light for motion sensing may include a single spherical lens, a motion sensor with a 360-degree range viewing field, a motion detector case encasing a switch cover, a time regulating switch, two level lighting control switch and a sensitivity regulating switch, which is used to adjust the level of sensitivity of the motion sensor up to about 30 feet in any direction with light mounted 8 feet high. A rubber plug and an extension cylinder are positioned between the printed circuit board assembly and a heat shield. The lamp shade assembly has a support frame, a frame base, a bottom panel, a plurality of side panels, and a decorative ring encircling a hollow recess or opening positioned in the middle of the bottom panel. The frame base of the lamp shade assembly is removably mounted to the base plate. The motion detector assembly is also removably mounted to the base plate and positioned within the lamp shade assembly such that the single spherical lens protrude through the hollow recess in the lamp shade assembly.

Optionally, the bottom panel and the side panels are glass panels, and the bottom panel may be partitioned into multiple individual panels. The single spherical lens may be encircled with a heat sink and a partition may be positioned between the single spherical lens and a circuit control board. The heat sink may be attached to an internal triac to allow the required power to be dissipated by the device and the partition may be utilized for UL safety requirements in order to prevent access to the electronics.

In another embodiment, the motion detector includes a lamp shade assembly, a motion detector assembly, and a base plate. The motion detector assembly has a single spherical lens

protruding through a hollow recess in the lamp shade assembly and is positioned on a circuit board assembly. A sensitivity regulating switch is used to adjust motion sensitivity up to about 30 feet in any direction, and the motion sensor detects motion in a 360-degree range of viewing field.

The hollow recess through which the single spherical lens protrudes may be located in the center of the lamp shade assembly. A switch case may envelop the printed circuit board assembly, a sensitivity regulating switch, a time regulating, a two level lighting control switch and switch covers. The time regulating switch may be used to adjust the length of time of illumination after motion detection. Optionally, a heat sink may encircle the single spherical lens, and a rubber plug and an extension may be removably mounted on the base plate and positioned between the printed circuit board assembly and a heat shield. A partition may be positioned between the printed circuit board assembly and the single spherical lens. The lamp shade assembly may have a support frame, a frame base mounted to the base plate, a bottom panel, side panels, and a decorative ring encircling the hollow recess. The bottom panel may be divided into a plurality of individual panels. The base plate may comprise socket assemblies and a cross bar assembly for mounting the motion detector to the electrical junction box in the ceiling.

For a better understanding of the present invention, together with other and further objects thereof, reference is made to the following description, taken in conjunction with the accompanying drawings, and its scope will be pointed out in the appending claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention are described below, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 is an inverted bottom view of a first embodiment of the ceiling mount light.

Fig. 2 is an exploded view of a first embodiment of the ceiling mount light.

Fig. 3 is an exploded view of a first embodiment of the motion detector assembly of the ceiling mount light.

Fig. 4 is an inverted bottom view of a second embodiment of the ceiling mount light.

Fig. 5 is an exploded view of a second embodiment of the ceiling mount light.

Fig. 6 is an exploded view of a second embodiment of the motion detector assembly of the ceiling mount light.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

While this invention is susceptible of embodiments in many different forms, there are shown in the figures and will herein be described in detail, preferred embodiments of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention, and is not intended to limit the broad aspects of the invention to the embodiments illustrated.

Figs. 1-6 illustrate the ceiling mount light in an inverted position. Referring to the drawings and initially Figs. 1-3, a ceiling mount light with a 360-degree range of motion sensing in accordance with a first embodiment **10** of the present invention generally comprises a lamp shade assembly **20**, a motion detector assembly **40**, and a base plate **60.**

The lamp shade assembly **20** may have a plurality of side panels **24** and a bottom panel **26**. The panels may be glass or some other transparent or translucent material known in the art.

The side panels **24** and the bottom panel **26** are supported by a support frame **22** and a frame base **30**. The frame base **30** of the lamp shade assembly **20** is removably mounted to the base plate **60** in some manner, such as with a decorative nut **34**, base screws **68**, and base nuts **72**. In the center of the bottom panel **26** of the lamp shade assembly **20** is a decorative ring **32** surrounding a hollow recess **28** through which the spherical lens **44** protrudes.

The motion sensor **48** of the motion detector assembly **40** is positioned inside the spherical lens **44** and is positioned in the center of a printed circuit board assembly **46**. The motion sensor **48** is used to detect movement, and the motion sensor **48** may be a passive infrared sensor, such as, for example, Model RE200B from Nippon Ceramic Co., Ltd., and Model LHi 778 from Perkin Elmer Optoelectronics. A photocell **53** may also be utilized as a part of the electronics to make sure that the lights do not come on in the daytime. The photocell **53** is activated through light passing through spherical lens **44** and provides adequate light response to prevent on-off cycling of the light when the light is activated. A spherical partition **45** may be used to separate the spherical lens **44** from the printed circuit board assembly **46** in order to isolate the electronics from the user to prevent access to the electronics. Further, the photocell may be recessed thereby increasing the accuracy of the dark detection scheme utilized by the electronics. A time regulating switch **54** and a sensitivity regulating switch are attached to the printed circuit board assembly **46** which may be a single pole mechanical slide switch to connect different fixed resistor values to change the timing or the sensitivity of the sensor. The time regulating switch **54** and the sensitivity regulating switch **56** positioned within the motion detector assembly **40** may be adjustable switches, a variable resistor, or a variable capacitor, for manually adjusting the length of time the illumination stays on and the level of sensitivity of the

motion detector. The time regulating switch **54** and sensitivity regulating switch **56** may each be covered with a switch cover **50**. The printed circuit board assembly **46**, the motion sensor **48**, the time regulating switch **54**, the sensitivity regulating switch **56**, and each switch cover **50** may be enveloped in a switch case **52**, which is partitioned for assembly and each part is detachable with case screws **47**.

Directly above the printed circuit board assembly **46** on the opposing side of the motion sensor **48** is a rubber plug **58** which has a plurality of openings through which electrical wiring can be threaded. Rubber plug **58** prevents the ingress of moisture into the electrical compartment of the motion sensor assembly **40**. The rubber plug **58** is mounted to a hollow extension cylinder **41,** through which electrical wiring can be threaded. The extension cylinder **41** fits snuggly through a heat shield **43** and is attached to the center of the base plate **60** by screws **70** or other attachment mechanisms. Motion sensors in general tend to malfunction when the ceiling mount light temperature increases above about 40°C, and the heat shield **43** serves to isolate the motion sensor **48** from radiant heat generated by the light bulbs. To further prevent heat building up inside the fixture, cross-ventilation is provided in the ceiling mount light **10**. Also attached to the base plate are a plurality of socket assemblies **62** for an illumination source, such as a bulb **64**. The illumination sources may be incandescent or other light emitting mechanisms known in the art. The base plate **60** is attached to a cross bar assembly **66** with screws **70** and nuts which are used to mount the ceiling mount light **10** to an electrical junction box.

In the embodiments shown, the electronics and the motion detector mechanisms **40** may be kept in close proximity below the heat shield **43** due to the generation of heat from lamps **64**. Temperature indications within the lamp shade area **20** may be as high as 100°C. However, since

the motion sensor **48** determines movement based upon temperature fluctuations, it is necessary to separate the motion sensor **48** from the higher temperature areas of the lamp shade assembly **20**. As shown in the drawings, since the ceiling mount light having 360 degree motion sensing **10** of the present invention is inverted, the heat will tend to rise away from the motion sensor **48** and electronics thereby allowing adequate readings and sensor activation. Further, the fixture **10** may have venting apertures **63a** formed in the base **30** which acts in conjunction with the aperture or opening **75** to allow air to flow through the interior of the fixture and reduce the heat in the interior thereof. Of course, alternative constructions are available such that the motion sensor **48** may be completely separated from the motion detector electronics. Thus, by referring to the motion detector assembly **40**, it is understood that the constituent elements may be placed in alternative and separate locations.

Referring to a second embodiment **100** of the present invention, Figs. 4-6, a ceiling mount light with a 360-degree range of motion sensing generally comprises a lamp shade assembly **20**, a motion detector assembly **40**, and a base plate **60.**

The lamp shade assembly **20** has a plurality of side panels **24** and plurality of bottom panels **26**. The panels may be glass or some other transparent or translucent material known in the art. The side panels **24** and the bottom panels **26** are supported by a support frame **22** and a frame base **30**. The frame base **30** of the lamp shade assembly **20** is removably mounted to the base plate **60** in some manner, such as with hollow rivets **38**, base screws **68**, and decorative nuts **73**. In the center of the bottom panels **26** of the lamp shade assembly **20** is a decorative ring **32** surrounding a hollow recess **28** through which the single spherical lens **44** protrudes.

The motion sensor **48** of the motion detector assembly **40** is positioned inside the single spherical lens **44** and is positioned in the center of a printed circuit board assembly **46**. The motion sensor **48** is used to detect the movement of heat and the motion sensor **48** may be a passive infrared sensor. A spherical partition **45** may be used to separate the single spherical lens **44** from the printed circuit board assembly **48** as noted herein. A heat sink **42** may be positioned around the single spherical lens **44** and mounted to a switch case **52** with pop rivet **49** or other attachment mechanisms.

A time regulating switch **54** a two level lighting control switch **56** and a sensitivity regulating switch **74** are attached to the printed circuit board assembly **46**. The time regulating switch **54**, the two level lighting control switch **56** and sensitivity regulating switch **74** positioned within the motion detector assembly **40** may be adjustable switches, a variable resistor, or a variable capacitor, for manually adjusting the length of time the illumination stays on when motion is sensed, stays on at reduced power level for accent lighting, and the detection range respectively. The level of sensitivity of the motion detector is up to about 30 feet. The time regulating switch **54** and sensitivity regulating switch **74** are each covered with a switch cover **50**. The sensitivity regulating switch is externally adjustable with trimpot knob **51**. The printed circuit board assembly **46**, the motion sensor **48**, the time regulating switch **54**, the two level lighting control switch **56**, the sensitivity regulating switch **74**, each switch cover **50** and trimpot knob **51**, are enveloped in the motion detector case **52**, which is partitioned for assembly and each half is detachable, with case screws **47**. The two level lighting control switch **56** may be utilized to allow the lights **64** to emit light at a first low luminance under non-motion sensing conditions, for example 50% illumination, and at a higher luminance when motion is detected by

the motion sensor or other motion sensor **48**. The time regulating switch **54** may allow the user to select how long after sensing motion the lights remain at a higher output.

Directly above the printed circuit board assembly **46** on the opposing side of the motion sensor **48** is a rubber plug **58** which has a plurality of openings through which electrical wiring can be threaded. The rubber plug **58** prevents ingress of moisture into the electronics compartment of the motion detector assembly **40**. The rubber plug **58** is mounted to a hollow extension cylinder **41,** through which electrical wiring can be threaded. The extension cylinder **41** fits snuggly through a heat shield **43** and is attached to the center of the base plate **60** with screws **70**. Again, since these sensors and a combination of the electronics tend to malfunction when they are in contact with excessive temperatures, the heat shield **43** serves to isolate the motion sensor **48** from radiant heat. To further assist in minimizing buildup of heat in the ceiling mount light **100**, ventilation holes **63** positioned between the lamp shade assembly **20** and the base plate **60** and clearance between spherical lens 44 and decorative ring **32** provide cross-ventilation.

Also attached to the base plate are a plurality of socket assemblies **62** for an illumination source, such as a bulb **64**. The illumination sources may be any type of incandescent light emitting mechanism as is known in the art of motion activated light fixtures. The base plate **60** is attached to a mounting bracket **66** with mounting screws **70**, which is used to mount the ceiling mount light **10** to an electrical junction box.

While there have been described what are believed to be the preferred embodiments of the present invention, those skilled in the art will recognize that other and further changes and modifications may be made thereto without departing from the spirit of the invention, and it is

intended to claim all such changes and modifications as fall within the true scope of the invention.